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Influence of (FeO+TiO2) abundance on the microwave thermal emissions of lunar regolith

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Abstract

Â© 2016, Science China Press and Springer-Verlag Berlin Heidelberg.One of the essential controls on the microwave thermal emissions (MTE) of the lunar regolith is the abundance of FeO and TiO2, known as the (FeO+TiO2) abundance (FTA). In this paper, a radiative transfer simulation is employed first to study the change in the brightness temperature (TB) with FTA under a range of frequencies and surface temperatures. Then, we analyze the influence of FTA on the MTE of the lunar regolith using microwave sounder (CELMS) data from the Chang'E-2 lunar orbiter, Clementine UV-VIS data, and lunar samples recovered from the Apollo and Surveyor projects. We conclude that: (1) FTA strongly influences the MTE of the lunar regolith, but it is not the decisive control, and (2) FTA decreases slightly with depth. This research plays an essential role in appropriately inverting CELMS data to obtain lunar regolith parameters.

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Keywords

(FeO+TiO) abundance 2, CELMS data, Lunar regolith, Microwave thermal emission, Radiative transfer simulation